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Sup

INTRA-OCULAR SYRINGING IN CATARACT EXTRACTION,

WITH A REPORT OF FIFTY-THREE OPERATIONS.

BY

J. A. LIPPINCOTT, A.B., M.D.,

PITTSBURGH, PA.



REPRINTED FROM THE TRANSACTIONS OF
THE MEDICAL SOCIETY OF THE STATE OF PENNSYLVANIA,
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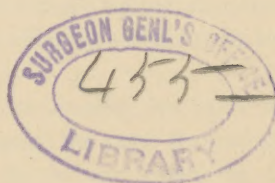
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INTRA-OCULAR SYRINGING IN CATARACT EXTRACTION, WITH A REPORT OF FIFTY-THREE OPERATIONS.

BY J. A. LIPPINCOTT, A.B., M.D.,
OF PITTSBURGH.

THE history of medicine, in all its departments, thoroughly illustrates the war incessantly waged between the progressive and the conservative elements in human nature. In our nineteenth century, especially its latter half, *laissez-faire* appears to be at a discount. "Forgetting the things that are behind, we reach forward" with almost feverish activity after a more refined diagnosis, more satisfactory therapeutics, and more efficient methods in surgery.

In the domain of ophthalmic surgery we observe the same unrest, the same stirring up of the dry bones, the same fearless discussion of principles once supposed to be forever settled by the authority of great names: *Nullius addictus jurare in verba magistri*. For example, it was long considered that in the method of operating for cataract proposed by the immortal von Graefe high-watermark had been reached, but the method has been since so greatly modified that the father of the Graefe operation would not recognize his own child. Even the iridectomy has been attacked and its necessity questioned by some of the most eminent operators, and a general return to the simple operation, as it is called, confidently predicted. It is not the purpose of the writer of this paper to enter into the merits of the iridectomy question, which may, for the present, be regarded as *sub judice*. He will content himself with saying that, while the statistics presented by DeWecker, Knapp, and other advocates of the simple operation would be difficult to improve upon, he scarcely feels justified in abandoning a

method which seems to him to be founded on reason and approved by experience.

The most important innovation introduced within recent years into the operation for the extraction of cataract is the injection of fluids into the anterior chamber after the expulsion of the lens. This procedure was instituted or rather reintroduced¹ in 1884, by McKeown, of Belfast, but was almost simultaneously practised by Wicherkiewicz, and was soon taken up by Panas, DeWecker, Knapp, Grand-Clément, Khodine, Chodin, Lee, Bell, and others. Up to the present time McKeown's following is not extensive, a fact which is not surprising when we consider the novelty and the apparently formidable nature of the method inaugurated by him.

I began to syringe out cortical remains October 17, 1888, from which date to June 4, 1890, I have made 57 extractions, using the syringe in all but 4 cases, being prevented from using it in these by rupture of the zonule either before or coincidently with the escape of the nucleus, attended with loss or threatened loss of vitreous. Of the 57 operations four were made so recently that I cannot report the visual results beyond saying that they are all successful.

The remaining 53 cases—including, to complete the record, 3 cases in which irrigation was not employed—are presented below in tabulated form.

In all the cases a preliminary iridectomy had been done. The size of the iridectomy varied from a generous coloboma when the pupil was rigid, to an approximately pure sphincterectomy when the pupil was freely dilatable.

Mode of Operating.—The instruments, after careful cleansing, were allowed to remain in absolute alcohol during cocainization of the eye, which consumed from fifteen to twenty minutes. During the same time an adequate supply of boric acid solution one-half of one per cent., made with distilled water and then boiled and filtered, was warmed, and a portion placed in a large Graefe's undine, by means of which the eye and its environment were long and thoroughly flushed, the patient being at the time encouraged to keep opening and shutting the lids and rolling the eyeball, so that the retrotarsal folds were pretty completely cleansed. During the

¹ Magnus, in v. Graefe's Arch. f. Ophth., xxxiv. 2, S. 167.

cleansing process the instruments were transferred from the alcohol to a vessel containing some of the boric solution.

The lid speculum was now applied ; and, with a Graefe knife, a large incision was made at the corneal margin (usually the lower), but entirely in corneal tissue. The laceration of the capsule was made in the shape of an inverted T with its horizontal portion near the lower margin of the lens. Immediately after the corneal incision, and again after the capsulotomy, the eyeball was freely irrigated with the boric solution. In case of hemorrhage further steps were delayed until that was checked ; and in the few cases in which blood entered the anterior chamber it was removed as thoroughly as possible by means of the syringe, either before or after the capsulotomy. The speculum was now removed and the lids gently wiped dry. The upper lid was then drawn slightly upward with the thumb, the latter being so applied that its lateral edge near the tip rested securely on the edge of the lid. Pressure being now made (through the lid) the lens was, as a rule, easily expelled. Counter-pressure on the lower lip of the wound was, however, sometimes made either directly with the tortoise-shell spoon, or with the index finger of the other hand through the medium of the inferior tarsal cartilage.

After giving the patient a moment's rest, the syringe-nozzle was then introduced, and a larger or smaller quantity of the boric solution was allowed to run in and out again, the nozzle being meanwhile moved gently from one end of the incision to the other. In general the anterior chamber was thus rapidly cleared ; but in some cases in which small masses clung tenaciously to the pupil edges, the point of the nozzle was pushed on until actual contact, aided by the continuous flow, dislodged the mass and drove it out of the chamber. Two or three drachms of the solution generally sufficed, but not infrequently an ounce was used, and in a few cases two ounces or more. In no case was there any manipulation of the cornea after the escape of the nucleus, and in no case was any instrument such as the tortoise-shell scoop permitted to touch the corneal surface for any purpose. After having examined the wound to see that no portion of iris or remnant of capsule had insinuated itself between the lips, the eye was again flushed with the solution, a drop of atropine instilled, and a cheese-cloth pressure bandage applied.

In cases in which the lens was clearly milky, or in which the suspensory ligament was suspected to be weak, or the vitreous to be fluid, the lid speculum was removed before the introduction of the cystitome. The advantages of this precaution were illustrated in several of the cases. Almost without exception the operation was performed by the searching light supplied by a portable electric lamp furnished with a condensing lens. In this manner the presence of cortical remains can probably be detected better than by any other means—certainly better than by the best daylight. The operation was always performed in the recumbent position—when feasible on the bed which the patient was to occupy—otherwise on an operating-table, from which the patient was lifted to bed by means of a sheet. The recumbent position was maintained for five or six days, permission being given to lie on the side not operated upon within an hour or two after the operation. The bandage was left undisturbed for three or four days unless there was some discomfort, which was rare. On the fifth or sixth day the bandage was finally removed and a hollow eye-shade, similar to that described by Dr. Gifford in the January number of the *Arch. of Ophthal.*, and which I have used for many years, substituted. When the healing process was slow the pressure bandage was retained until the wound was united.

The essential particulars of each case are presented in the following table :

TABLE I.

No.	Name, Age, General Health.	Quality of Cataract, Functional Examination.	Operation, Incidents, Course of Healing Process, Duration of Treatment.	Resulting Vision.
1	Mrs. M. W., 72; fair.	Glaucomatous, previous iridectomy, limited visual field.	Oct. 17, 1888. Cortical débris abundant after expulsion of nucleus; easily removed with a <i>compte gouttes</i> armed with curved silver nozzle. Air bubble entered chamber, and removed by continuing the irrigation; 16 days.	December 13, 1888. + 10 D. S. = $\frac{20}{\text{LX}}$ Media clear. Well-marked cupping of disk.
2	Miss C. F., 55; good.	Hard, mature, normal.	Oct. 23. Irrigation by means of pipette used in Case No. 1; smooth; 12 days	February 12, 1889. + 12 $\bigcirc$ + 1 cy. hor. S. = $\frac{20}{\text{XL}}$ February 13, 1890. + 12 = $\frac{20}{\text{XXX}}$
3	Mrs. R. U., 57; good.	Hard, mature, normal.	Oct. 25. Smooth; 11 days.	January 11, 1889. + 5.5 $\bigcirc$ + 2.5 cy. 18° S. = $\frac{20}{\text{XXX}}$
4	A. McC., 72; good. Family history of mental derangement.	Hard, mature, normal.	Nov. 15. Anterior chamber irrigated with specially devised syringe; 28 hours after operation patient was discovered walking about the hospital with bandages off; delirious for 24 hours; smooth; 12 days.	March 4, 1889. + 13 D. S. = $\frac{20}{\text{XX}}$
5	Mrs. C. J., 66; feeble.	Hard, mature, projection not very good.	Dec. 12. Cornea flabby and wrinkled after incision; smooth; 10 days.	January 24, 1888. + 9 D. S. = $\frac{20}{\text{LXXX}}$ Media clear. Optic nerve atrophic.
6	Mrs. M. McM., 72; good.	Hard, hyper-mature, normal.	Dec. 14. Much cortical syringed out; smooth; 11 days.	March 3, 1889. + 11 $\bigcirc$ + 1.5 cy. hor. S. = $\frac{20}{\text{XXX}}$
7	Mrs. A. C., 64; feeble. Decided mental hebetude.	Hard, mature, apparently normal.	Feb. 15, 1889. After irrigation found posterior capsule quite opaque; removed opaque capsule through a small corneal incision on April 24; 19 days.	Soon after operation about $\frac{20}{\text{CC}}$ June 5, 1889 (after secondary operation). + 10 $\bigcirc$ + 1.5 cy. hor. S. = $\frac{20}{\text{XL}}$
8	P. D., 58; good.	Hard, mature, normal.	March 1. Smooth; 10 days.	March 26, 1889. + 12.5 S. = $\frac{20}{\text{XXX}}$
9	F. B., 55; good.	Complicated; partly transparent; always near sighted; normal.	March 1. Syringe brought out considerable quantity of soft cortex; smooth; 10 days.	May 11, 1890. First appearance since operation. He says he could see to read the "newspaper through even by lamplight" without glasses for 8 months after the operation. In Nov. 1889, he received a violent blow on the eye, and has not seen well since, though he is able to work. To-day S. = $\frac{20}{\text{C}}$. No glass helps. Large posterior staphyloma; media clear.

No.	Name, Age, General Health.	Quality of Cataract, Functional Examination.	Operation, Incidents, Course of Healing Process, Duration of Treatment.	Resulting Vision.
10	Mrs. W. M., 62; feeble.	Hard, hypermature, projection poor.	March 15. Smooth; 12 days.	May 25, 1889. + 10 S. = $\frac{8}{c}$. Media perfectly clear; pronounced atrophy of disk. Sept. 3, 1889, S. = $\frac{15}{cc}$
11	Mrs. J. W., 67; fair.	Hard, mature, normal.	March 15. Smooth; 21 days.	May 21, 1889. + 12 D. S. = $\frac{20}{xx}$
12	Mrs. J. L., 64; good.	Hard, mature, normal.	April 2. Considerable cortical remains; small masses persistently adhered to pupil margins, and detached by touching with syringe nozzle; smooth; 14 days.	May 23, 1889. With + 11 $\odot$ + 1.5 cy. 5° S. = $\frac{20}{xx}$ Mar. 6, 1890. Cannot see so well; has been very ill for several weeks. S. = $\frac{20}{c}$. Capsule was slightly wrinkled; discission, May 14, 1890. + 10 + 1.5 cy. hor. S. = $\frac{20}{xl}$ Slight opacity of capsule remains.
13	Mrs. B. G., 71; good.	Hard, hypermature, normal.	May 6. Smooth; 14 days.	June 21, 1889. + 9 $\odot$ + 3 cy. 8° S. = $\frac{20}{xl}$
14	S. J., 70; good.	Hard, mature, normal.	May 9. Smooth; patient became delirious 12 hours after operation, and remained so about 24 hours; 16 days.	July 7, 1889. + 10.5 S. = $\frac{20}{xx}$
15	S. W., 38.	Soft, traumatic; extensive anterior synechia.	May 10. Iritomy with De Wecker's scissors; soft lens tissue removed with syringe.	July 1, 1889. + 11 S. = $\frac{20}{lx}$ Some opacity of capsule.
16	Mrs. S. B., 65; fair.	Hard, mature, normal. (Other eye enucleated after cataract operation by another surgeon.)	July 9. Smooth; 12 days.	January 9, 1890. + 11 D. S. = $\frac{20}{xxx}$
17	W. H., 52; good.	Soft, hypermature, good.	Oct. 2. Nucleus small, most of lens remaining in anterior chamber before irrigation.	April 2, 1890. + 10 D. S. = $\frac{20}{lxxx}$
18	Mrs. S., 74; good.	Cat. lactea good.	Oct. 6. Lens matter like whey; small nucleus; smooth; 16 days.	November 12, 1889. + 10 D. S. = $\frac{20}{xxx}$
19	G. P., 73; good.	Hard, mature, normal.	Oct. 9. Smooth; 10 days.	November 26, 1889. + 11 $\odot$ + 2 cy. 170° S. = $\frac{20}{xx}$
20	M. V., 60; good.	Fundus reflex good through periphery S. = $\frac{2}{cc}$ projection normal.	Oct. 12. After expulsion lens remarkably transparent at margins, clear lens matter easily syringed out; smooth; 10 days.	November 16, 1889. + 11 $\odot$ + 2.25 cy. hor. S. = $\frac{20}{xx}$ —

No.	Name, Age, General Health.	Quality of Cataract, Functional Examination.	Operation, Incidents, Course of Healing Process, Duration of Treatment.	Resulting Vision.
21	W. B., 49; good.	Right eye. Soft, mature, normal.	Dec. 3. Cortical abundant; syringed more than 2 ounces boric solution into chamber; smooth; 11 days.	December 30, 1889. + 5 $\bigcirc$ + 3 cy. hor. S. = $\frac{20}{XXX}$ April 26, 1890. + 6 $\bigcirc$ + 1.25 cy. 62° S. = $\frac{20}{XX}$
22	J. A. D., 56; feeble.	Hard, mature, normal. (Other eye removed for irido-cyclitis after cat. extraction by another operator.	Dec. 6. Operation clean and satisfactory. Night of eighth day struck his eye during sleep; mild attack of iritis, which yielded to treatment in a few days; 15 days.	January 9, 1890 + 6.5 $\bigcirc$ + 2 cy. hor. S. = $\frac{20}{XXX}$ April 17, 1890. + 7 $\bigcirc$ + .5 cy. vert. S. = $\frac{20}{XX}$
23	Miss E. D., 50; good.	Right eye. Soft mature, normal.	Dec. 9. Smooth; 12 days.	January 11, 1890. + 11 + 2.5 cy. hor. S. = $\frac{20}{LX}$ April 8, 1890. Dissection of capsule. May 26, 1890. + 11 + 2 cy. hor. S. $\frac{20}{XXX}$
24	Mrs. S. P., 70; feeble.	Hard, mature, normal.	Dec. 12. Smooth; 9 days.	April 2, 90. + 11 + 2 cy. 138° S. = $\frac{20}{XX}$
25	Mrs. F. G., 54; good.	Soft, hypermature, normal.	Dec. 16. Capsule very opaque, except small point below; smooth; 17 days.	April 23, 1890. + 8 S. = $\frac{10}{CC}$
26	R. J., 71; good.	Hard, hypermature, normal.	Dec. 16. Smooth; 8 days.	March 13, 1890. + 9 + 1 cy. hor. S. = $\frac{20}{XL}$ Media absolutely clear; nothing abnormal in fundus. Says he "can see as well as ever he did in his life."
27	Mrs. M. A., 65; good.	Hard, mature, normal.	Dec. 20. Smooth; 13 days.	February 23, 1890. + 9 + 2 cy. 178° S. = $\frac{20}{XXX}$
28	W. S., 55; good.	Hard, mature, normal.	Dec. 21. Smooth; 12 days.	March 31, 1890. + 10 = $\frac{20}{XX}$
29	P. V. J., 53; good.	Completely fluid; good.	Jan. 1, 1890. On using cystitome liquid lens matter gushed out followed by vitreous which was also fluid; <i>syringe not used</i> ; healing slow; 23 days.	March 14, 1890. + 8.5 + 2 cy. 80° S. = $\frac{20}{XL}$
30	E. D., 56; good.	Soft, mature, not tested.	Jan. 1. Operation satisfactory; iritis ninth day from exposure to a cold draught; recovery in 12 days. Jan. 25th, another attack from same cause; recovery in two weeks. For safety retained in hospital till 54th day. No synechiæ.	March 18, 1890. + 9 + 1.75 cy. hor. S. = $\frac{20}{LX}$ Media clear; nerve decidedly atrophic; pupil free.
31	Mrs. W. N., 56; feeble.	Hard, mature, normal.	Jan. 1. Smooth; 12 days.	April 3, 1890. + 12 + 1 cy. hor. S. = $\frac{20}{XX}$

No.	Name, Age, General Health.	Quality of Cataract, Functional Examination.	Operation, Incidents, Course of Healing Process, Duration of Treatment.	Resulting Vision.
32	G. W. L., 48; good.	Soft, mature.	Jan. 4. Operation satisfactory. Jan. 5, 24 hours after operation, found patient with bandage off; eyes rebanded. Two hours later patient again removed bandage, stole out of hospital and went to his home four miles away, walking much of the distance; 1 day.	April 23, 1890. + 11 + 1 cy. vert. S. = $\frac{20}{xxx} +$
33	Miss M. S., 40; good.	Soft, hypermature.	Feb. 11. Nucleus 5 mm. in diameter; cortex liquid; smooth; 9 days.	February 24, 1890. + 8 D. S. = $\frac{20}{cc}$ Capsule clear. Float- ing opacities in vitre- ous.
34	T. R., 76; good.	Hard, hypermature (7 yrs. old), normal.	Feb. 22. Vitreous escaped with lens; <i>syringe not used</i> ; smooth; 11 days.	April 24, 1890. + 11 + 1 cy. hor. S. = $\frac{20}{lx}$ Media transparent.
35	Mrs. A. J., 74.	Right eye. Hard, mature, normal.	Feb. 22. Operation satisfactory, though patient was very restless and almost unmanageable; smooth; 16 days.	March 31, 1890. + 11 S. = $\frac{20}{lx} -$
36	P. G., 54; good.	Soft, mature, normal. (Stricture nasal duct treated before operating on cataract.)	Feb. 28. Smooth; 13 days.	April 15, 1890. + 9 + 1 cy. hor. S. = $\frac{20}{xxx}$ May 13, 1890. + 9 + 1.5 cy. 10° S. = $\frac{20}{xv}$
37	A. K., 68; fair.	Hard, hypermature; pro- jection poor. Other eye, light perception extremely feeble.	March 4. Patient nearly completely deaf and of feeble intelligence; eye-ball rolled incessantly, still operation was completed pretty satisfactorily; but before the bandage was applied patient suddenly and violently snapped his eyelids together rupturing capsule or zonule, and forcing fluid vitreous from the wound. Healing process smooth; 16 days.	March 20, 1890. S. = light perception; vitreous muddy; very small retinal detachment below and outward.
38	Mrs. M. E. W., 38; good.	Right eye. Soft, hypermature (6 years), normal.	March 11. Much cortical syringed out; 11 days.	April 26, 1890. + 7.5 + 3.5 cy. 8° S. = $\frac{20}{xx} -$
39	W. B., 49; good.	Left eye. Soft, mature, normal.	March 26. Abundant cortical syringed out; smooth; 11 days.	May 9, 1890. + 6 + 2.25 cy. 172° S. = $\frac{20}{xii}$
40	E. G., 61; good.	Complicated, hypermature, corneal opacities from old ulcers.	March 27. Healing rather slow; 13 days.	April 18, 1890. + 11 + 3.5 cy. hor. S. = $\frac{20}{lx}$
41	Mrs. L. L.	Hard, mature, normal.	April 4. Opaque capsule left. April 9, mild attack of iritis with no pain and but slight congestion; pupil good size, but small synechia at upper part.	April 24, 1890. + 10 + 1.5 cy. hor. S. = $\frac{20}{lx} -$ May 12, 1890. + 9.5 + 5 cy. hor. S. = $\frac{20}{xl}$

No.	Name, Age, General Health.	Quality of Cataract, Functional Examination.	Operation, Incidents, Course of Healing Process, Duration of Treatment.	Resulting Vision.
42	J. V., 58; feeble.	Left eye. Opaque in centre, but translucent in periphery. Duration many years. Right eye in 1886 showed incipient cataract and marked signs of old choroiditis.	April 6. Left eye. Nucleus small; syringed out large quantity of transparent cortical; smooth; 9 days.	June 7, 1890. + 12 + 1 cy. hor. S. = $\frac{20}{XX}$
43	W. K., 52; good.	Soft, mature, normal.	April 6. In using cystitome this instrument, acting as a hook, tore off anterior capsule, leaving it attached just inside of wound; nucleus small; large quantity of cortical syringed out; finally, reflected ant. capsule removed with iris forceps; smooth; 9 days.	May 13, 1890. + 9 + 1.25 cy. hor. S. = $\frac{20}{XX}$
44	J. G., 70; good.	Hard, partly transparent; no change for several months; normal.	April 8. Smooth; 9 days.	April 26, 1890. + 10 + 1.25 cy. hor. S. = $\frac{20}{XL}$ Capsule perfectly clear; several small brownish patches on retina in macular region.
45	Mrs. A. M., 65; good.	Hard, mature; projection poor; patient greatly addicted to alcohol.	April 8. Smooth; 11 days.	April 25, 1890. + 10 S. = $\frac{20}{LX}$ Media perfectly clear; decided bluish atrophy of disk.
46	A. K. E., 64; good.	Cat lactea; duration at least 10 yrs.; normal.	April 11. The instant cystitome touched capsule, most of lens spurted out in shape of thin whey-like fluid; nucleus, 3 mm. in diameter, retreated into upper part of chamber, but was slowly coaxed down by manipulating upper lid; pupil made jet black instantaneously by use of syringe; smooth; 9 days.	May 6, 1890. + 9 S. = $\frac{20}{XX}$
47	J. C., 60; feeble. Face deeply furrowed and covered with eczema.	Hard, mature, normal.	April 14. Eye well in a week; patient attacked with bronchitis on eighth day. Discharged cured ten days later.	May 12, 1890. + 10 + 1 cy. hor. S. = $\frac{20}{XL}$
48	Mrs. M. C., 82; very feeble in body and mind.	Hard, mature, doubtful. Other eye, no light perception.	April 16. Operation satisfactory, and everything favorable till twelfth day, when slight congestion appeared with a burning sensation but no pain. Eight days later eye clear and pupil large, but a slight adhesion at upper papillary margin; 20 days.	May 31, 1890. 10 D. S. = $\frac{20}{CC}$ Media perfectly clear; nerve markedly atrophic.
49	Mrs. L. M., 61; not good.	Hard, hypermature, normal.	April 19. Incision completed with more than usual care, and without dragging; lens came well forward. On gently introducing cystitome lens retreated upward. A little tentative expulsive movement caused vitreous to appear in wound. With wire scoop delivered cataract, which was large and very hard and dark; small bead of vitreous escaped; syringe not used; 15 days.	May 14, 1890. + 11 + 1 cy. hor. S. = $\frac{20}{XX}$

No.	Name, Age, General Health.	Quality of Cataract, Functional Examination	Operation, Incidents, Course of Healing Process, Duration of Treatment.	Resulting Vision.
50	Mrs. M. C., 62; fair.	Nucleus and posterior capsule opaque; other parts of lens translucent; condition stationary for years; very poor projection; eye never good.	April 21. Sockets remarkably deep. Patient greatly agitated; eyes rolling constantly. Lens on being expelled was quite large and quite translucent, except in centre and at posterior pole. Syringe not used with usual freedom on account of nervousness of patient. Slight catarrhal conjunctivitis in both eyes; 8 days.	May 11, 1890. + 8 S = $\frac{10}{CC}$ Lower half of capsule clear. Part just above centre opaque; floating opacities in vitreous. Large patch of atrophy of choroid below and to outer side of macular region.
51	H. B. S., 75; good.	Hard, partly translucent; stationary; good.	April 28. Lens on expulsion amber colored, but transparent in periphery. Some cortex left in chamber easily and quickly expelled by syringing. 8 days.	May 26, 1890. + 8 + 3.5 cy. hor. S. = $\frac{20}{XX}$ —
52	J. E., 75; good.	Hard, mature, good.	May 12. Nucleus dark; unusual quantity of cortical syringed out; some catarrhal conjunctivitis; 12 days.	June 9, 1890. + 10 + 2 cy. hor. S. = $\frac{20}{XX}$ and $\frac{10}{LX}$, and improving. Slight opacity of capsule, apparently diminishing.
53	Mrs. M. B., 68; good.	Hard, mature, normal.	May 26. Smooth; 12 days.	June 9, 1890. + 10 + 1 cy. hor. S. = $\frac{20}{XX}$ Capsule slightly opaque; sight improving.

TABLE II.—SUMMARY OF VISUAL RESULTS.

$\frac{20}{XII}$	1 case.	$\frac{20}{XXX}$	9 cases.	$\frac{20}{CC}$	2 cases.
$\frac{20}{XV}$	1 "	$\frac{20}{XL}$	9 "	$\frac{15}{CC}$	1 case.
$\frac{20}{XX} + 1$	"	$\frac{20}{LX}$	8 "	$\frac{10}{CC}$	2 cases.
$\frac{20}{XX}$	6 cases.	$\frac{20}{LXXX}$	2 "	0	1 case.
$\frac{20}{XX} - 9$	"	$\frac{20}{C}$	1 case.	Total 53 cases.	

Reviewing the cases detailed above we may consider :

A. Accidents and abnormalities during operation.

(1) Air entered anterior chamber in one case (No. 1), owing to imperfect instrument. Result, good.

(2) Vitreous escaped in four cases; in three (Nos. 29, 34, and 49) immediately after exit of lens, so that the syringe was not used. In Case No. 29 the lens, which was wholly fluid, gushed out at touch of cystitome, followed by vitreous. In Case No. 49 the lens

was large and nearly black. Zonule ruptured during corneal incision, which was made slowly. On attempting expulsion vitreous presented in wound. Extraction effected easily with wire scoop, followed by small bead of vitreous. In Case No. 34 moderate amount of vitreous followed lens. In the fourth case (No. 37) the patient was almost stone deaf, and, beside, excessively restless. Nevertheless, operation proceeded smoothly until the bandage was about to be applied, when a most violent orbicular spasm ruptured the posterior capsule and forced out a considerable quantity of watery vitreous, producing the only case of failure in the series. The three other cases had a good result.

(3) Lens almost completely liquid in three cases (Nos. 18, 33, and 46) and completely so in one case (No. 29). Results in all, good.

(4) Cataract more or less translucent in five cases (Nos. 20, 42, 44, 50, and 51). Results in four, good. In one (No. 50) only moderate, owing to antecedent disease of the vitreous and fundus. In this case the prognosis was bad, although an accurate diagnosis was impossible; but my habit is to operate on all cases in which there is a hope (happily realized in this instance) of even slightly ameliorating the patient's condition.

B. Complications during the healing process.

(1) Slow healing of wound in two cases (Nos. 29 and 40). In the first there was escape of vitreous, preventing the use of the syringe. Vision $\frac{20}{XL}$. In the second, the slow healing may have been due to the nutrition of the cornea being interfered with by old ulceration which had led to corneal opacities. Vision $\frac{20}{LX}$.

(2) Delirium in two cases (Nos. 4 and 14), perhaps from cocaine. One of them (No. 4) was eccentric, and family mental history not good. Results, $\frac{20}{XX}$ and $\frac{20}{XX}$ —.

(3) *Iritis* in four cases (Nos. 22, 30, 41, and 48). As this was really the only important complication observed during treatment, the cases may be analyzed in detail.

Case No. 22.—Operation smooth. Syringe used freely. Eighth day, condition of eye perfect. That night patient suddenly awoke in the act of striking the eye. Next day pain and other symptoms of iritis, which subsided in

a few days, leaving no adhesion. Vision, $\frac{20}{XX}$ —. The other eye had been enucleated by myself for irido-cyclitis following cataract extraction by another surgeon.

Case No. 30.—Operation smooth. Syringed. On ninth day eye looked well. Carelessly exposed himself to cold draught from open window. Next day globe congested and soon livid and chemosed. Iritis subsided in twelve days. Several days later exposure to cold draught from a badly constructed door brought on another attack. Recovery in about two weeks. No synechia. Vision, $\frac{20}{LX}$ +

Case No. 41.—Very opaque capsule left at operation. On fifth day I observed evidences of iritis, but they were so mild that patient was unaware of anything being wrong. Result, small synechia above. Capsule clear in limited area below. Vision, $\frac{20}{LX}$.

Case No. 48.—Health and mind feeble, and functional examination difficult. Operation smooth. Everything favorable till twelfth day, when slight congestion was noticed. No pain, but some burning complained of. The iritis subsided in about a week, leaving a small synechia at upper part. Rest of pupil, which was large, was free, and capsule, except at point of adhesion, perfectly transparent. Vision, $\frac{20}{CX}$. Marked atrophy of disc.

Of these four cases of iritis, two were apparently caused by exposure to cold, and one was due to a blow. The remaining one was doubtless directly connected with the operation. All but one were mild, and probably none had any serious effect on the resulting vision.

In the case in which the operation failed there was no inflammatory symptom. The wound healed promptly and kindly, and in a week the eye, externally, presented all the appearances of a successful extraction. There was in the whole series no case of irido-cyclitis or of suppuration, and, excepting in two of the iritis cases, no serious discomfort was complained of.

In view of the progress made in recent years, perhaps the time has arrived when we should no longer be content with the old idea of a successful cataract operation, viz., one which in a general way restores sight, but should endeavor to procure the highest degree of acuity of vision attainable in each case. In order to determine the methods by which this result may be most easily arrived at, it is desirable not merely to compare the final visual results reached under different methods, but to inquire into the circumstances under which, in each case, these results were brought about. No

surgeon operates on a totally blind eye, *i. e.*, every man "selects his cases;" but, owing to differences of temperament and other causes, this selection is made by different operators, and even by the same operator at different periods, according to rules which are far from uniform. For this reason, two men exhibiting equal skill and pursuing the same method may obtain visual results which are widely different.

It may be assumed that the best method of operating for cataract is the one which, other things being equal, enables us most completely to eliminate all obstructions to vision referable to the lens; in other words, to make the operation surgically complete. As a contribution to this part of the subject the following table has been prepared, giving, in all of my cases showing $\frac{20}{XL}$ or less, the causes, so far as ascertained, of the imperfect vision.

TABLE II.—SUMMARY OF CASES OF $\frac{20}{XL}$ AND UNDER WITH CAUSES.

Vision.	CAPSULE CLEAR.									Capsule opaque.	Total.
	Atrophy of nerve.	Atrophy from glaucoma.	Choroidal atrophy.	Staphyloma posticum.	Retinal disease.	Opacities in vitreous.	Escape of vitreous.	Opacity of cornea.	Undetermined, irregular astigmatism, etc.		
$\frac{20}{XL}$. . .	...	...	...	...	1	...	1	...	3	4	9
$\frac{20}{LX}$. . .	2	1	...	...	...	...	1	1	1	2	8
$\frac{20}{LXXX}$. . .	1	...	...	...	...	...	...	...	1	...	2
$\frac{20}{C}$. . .	...	...	...	1	...	...	...	...	...	...	1
$\frac{20}{CC}$. . .	1	...	...	...	...	1	...	...	...	...	2
$\frac{15}{CC}$. . .	1	...	...	...	...	...	...	...	...	...	1
$\frac{10}{CC}$. . .	...	...	1	...	...	...	...	...	...	1	2
0 . . .	...	...	...	...	...	...	1	...	...	...	1
Total . .	5	1	1	1	1	1	3	1	5	7	26

Thus, of 53 cases operated upon, 7, or $13\frac{2}{10}$ per cent., have been thus far left with opacity of the capsule, whereas in 45 cases (ex-

cluding the case of failure, and including the cases with $\frac{20}{XXX}$ and better)—*i. e.*, in $84\frac{9}{10}$ per cent. the operation was surgically complete.

Secondary operations.—The statistics presented above show the results obtained without any secondary operation on the capsule except in three cases (Nos. 7, 12, and 23). In the first an opaque capsule was removed through a small corneal incision, raising the vision from $\frac{20}{CC}$ to $\frac{20}{XL}$. In the second discission raised the vision from $\frac{20}{C}$ to $\frac{20}{XL}$, but the operation was incomplete, and slight opacity still remains. In the third the sight was improved by discission, from $\frac{20}{LX}$ — to $\frac{20}{XXX}$. In other words, excluding the case of failure, 42 cases (including all but one of the cases of $\frac{20}{XXX}$ and better)—*i. e.*, $79\frac{4}{10}$ per cent. of all the cases operated upon—required no secondary operation.¹

General remarks and conclusions.—There are several points in regard to the above reported series of cases that seem worthy of note:

1. The absence, excepting in one case (No. 41), of inflammation or irritation directly referable to the operation; and the absence, also, excepting in one case (No. 30), of inflammation from any source serious enough to cause anxiety.

2. The large proportion of cases in which a high degree of visual acuity was obtained.

3. The large proportion of cases in which the operation was surgically complete—*i. e.*, in which no capsular opacity remained to be treated by secondary operations. (I make no note of the absence of suppurative inflammation, because purulent processes, as remarked by Sattler,² Knapp,³ and others, are of late becoming more and more rare.)

These advantages I cannot but think attributable, in a large degree, to the fact of the anterior chamber being so thoroughly

¹ It is probable that a number of these cases will in time develop "wrinkled capsule," and so require surgical interference. If so, such changes will be put on record when the opportunity presents itself.

² Quoted by Knapp, *Arch. of Ophth.*, vol. xvii. p. 69.

³ *Ibid.*

cleared of residual cortex. No matter whether we agree with DeWecker,¹ that inflammation after cataract extraction is due to sepsis conveyed through a migration cicatrix (*cicatrice à migration*), or with Meyer,² that the sepsis is sometimes endogenous, or whether we hold that many cases of inflammation, whether purulent or non-purulent, may be purely traumatic, it must be generally admitted that, whether simply as foreign material, or as a nidus for microbic multiplication, cortical remains may act as a predisposing cause of inflammatory action. It appears reasonable, also, to suppose that they may, by adhering to the capsule, cause or increase its opacity, and thus partially frustrate the object of the operation.

From all points of view, then, it seems proper that we should seek the means by which lenticular débris can be most gently, quickly, and thoroughly removed. My own belief is that manipulation of the cornea is inadequate—may, when prolonged, be injurious—and that the end in view is best attained by irrigation. In addition to thoroughly evacuating the anterior chamber, the syringe gently replaces prolapsed iris, and completely cleanses the lips of the wound, thus securing perfect coaptation and rapid healing, and, incidentally, preventing the entrance of germs.

From what has preceded, it is evident that I do not regard the injection of a few drops of an antiseptic solution, in order to sterilize the contents of the anterior chamber, as fulfilling all the requirements. It may be doubted, without disrespect to the distinguished men who make use of this procedure, whether it accomplishes even the limited object aimed at; for an antiseptic, to be effective, must surely be dangerously irritating to the delicate structures in the interior of the eye.

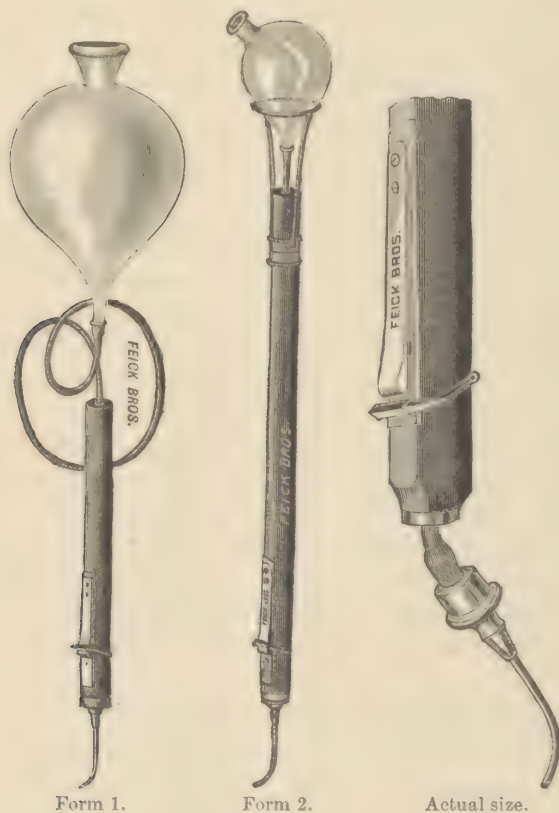
But, in point of fact, antisepsis in surgery tends more and more to be replaced by asepsis. Germs are now flooded out instead of being destroyed *in situ*. I believe the crowning glory of our era, in so far as surgery is concerned, to be the development of the science and art of cleanliness. In accordance with this view, the solution I use is not, strictly speaking, antiseptic. Practically, it consists of boiled distilled water containing just enough boric acid to prevent the injurious effects which have been found, by myself and others, to follow the use of water alone.

In order that irrigation of the anterior chamber may be accom-

¹ Annales d'oculistique, ci. p. 168.

² Ibid., cii. p. 134.

plished effectively and safely, it is important to employ a suitable instrument. At the last meeting of the American Ophthalmological Society I read a paper on this subject,¹ and described a syringe which consisted "essentially of a bit of black rubber tubing with a curved flat gold nozzle at one end, and a small metal reservoir at the other." The tubing passed through a hollow hard-rubber



handle, in which was fixed a short piston controlled by the index-finger, and serving, by pressure on the rubber tubing, to stop or retard the current. Soon after that meeting, in order to be able to dispense with an assistant, as well as to secure a uniform pressure, I had the instrument made in the form in which you see it. The reservoir, which is of glass, is attached to the upper end of the

¹ Trans. American Ophth. Society for 1889, p. 341.

handle, and will hold about an ounce. This is sufficiently large, because, even if two or three times this quantity of fluid is required, the patient will be benefited by the momentary respite obtained while the reservoir is refilling; and the objections made to a second or third introduction of the nozzle are, in my opinion, entirely groundless. If, however, a larger reservoir is desired, and an assistant is available, the necessary change in the form of the instrument is easily effected by substituting a longer piece of rubber tubing.¹

This syringe, as modified, has been used in the great majority of the cases reported in this paper; and, from experience during the year just passed, I am in a position to reiterate, with confidence, the following statements made in the article referred to:

"1. As there is no backward flow, it (the syringe) has no tendency to become septic in use, except at the point of the nozzle, and the latter can be readily pulled off and thrown into boiling water or alcohol. If the purity of the other parts of the apparatus is suspected, it is easy to place the reservoir in boiling water, and to replace the old rubber tubing with a new piece.

"2. This instrument can always be depended upon to work smoothly.

"3. It is held like a penholder, and is as easily and securely handled.

"4. As the ejecting force is proportional to the height of the column of the liquid, it is, of course, under absolute control. . . . Should a *per saltum* movement be desired, this can be effected . . . by intermittent pressure on the short piston.

"5. It goes without saying, that in using this syringe there is no possibility of the entrance of air into the eye."

The instrument is made by Feick Brothers, surgical instrument makers, of Pittsburg, Pa.

¹ The syringe is made in such a way that Forms 1 and 2 are quickly interchangeable. Thus the small reservoir may be removed from Form 2, and the metal framework slipped off. All that remains, then, is to insert the small hard-rubber nozzle (which will be found at the lower end of the tubing belonging to the large reservoir) into the tubing which remains in the handle. The large reservoir can be fixed to an upright post attached to the bedside, and the height regulated by a set-screw.

